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(71)Applicant : TOKYO ELECTRON LTD

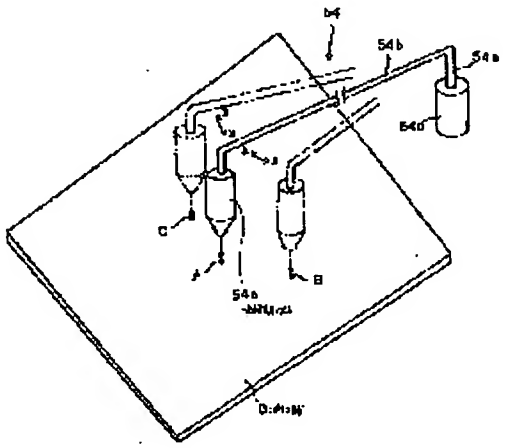
(72)Inventor : MOTODA KIMIO
SHINOKI TAKETORA
TATEYAMA KIYOHISA

(54) APPARATUS AND METHOD FOR TREATMENT

(57)Abstract:

PROBLEM TO BE SOLVED: To uniformly supply treating liquid to be supplied over the whole surface of a body to be treated.

SOLUTION: In order to wash a glass substrate G held rotatably with a spin chuck, a washing liquid discharging nozzle 54c for discharging a washing liquid is, in a freely swingable manner, provided in an almost central part of the glass substrate G. Since a position of the washing liquid to be discharged to the glass substrate is not constant, though a stagnation point is temporarily generated at a certain discharge position, when a washing liquid discharge nozzle 4c swings and the discharge position is changed, the stagnation point before changing of a discharge position is soon solved by rotation of the spin chuck, and the stagnation is gone. Therefore, the phenomenon that washing of the glass substrate G becomes ununiform due to generation of the stagnation at a specific position can be prevented.



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CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS CORRECTION OR AMENDMENT

[Translation done.]

* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] A processor characterized by providing a maintenance revolution means to rotate holding a processed object, a nozzle for supplying processing liquid to a processed object which rotated with said maintenance revolution means, and a splash means to rock said nozzle to the midst to which said nozzle supplies processing liquid.
[Claim 2] A processor characterized by providing the following. A maintenance revolution means to rotate holding a processed object A nozzle for supplying processing liquid to a processed object which rotated with said maintenance revolution means The plate member which forms a part of processing liquid flow channel at the time of the alignment of the surface location being carried out to the almost same degree as the location of the front face of a processed object, rotating synchronizing with revolution actuation of the processed object by said maintenance revolution means, and the supplied processing liquid spreading on the front face of a processed object according to a centrifugal force while adjoining the outside of the processed object held by said maintenance revolution means, in case processing liquid supplies from said nozzle
[Claim 3] A processor characterized by providing further a splash means to be a processor according to claim 2 and to rock said nozzle to the midst to which said nozzle supplies processing liquid.
[Claim 4] A processor characterized by providing the following. A maintenance revolution means to rotate holding a processed object A nozzle for supplying processing liquid to a processed object which rotated with said maintenance revolution means In case processing liquid is supplied from said nozzle, while adjoining an outside of a processed object held by said maintenance revolution means Alignment of the surface location is carried out to the almost same degree as a location of a front face of a processed object. An inner cup which rotated synchronizing with revolution actuation of a processed object by said maintenance revolution means, and was equipped with a plate member which forms a part of processing liquid flow channel at the time of supplied processing liquid spreading on a front face of a processed object according to a centrifugal force in one An outside cup arranged so that a periphery of said inner cup may be enclosed
[Claim 5] A processor characterized by providing further a splash means to be a processor according to claim 4 and to rock said nozzle to the midst to which said nozzle supplies processing liquid.
[Claim 6] An art which is an art which supplies processing liquid to a processed object and performs processing to a processed object while rotating a processed object, and is characterized by supplying processing liquid, fluctuating a supply location of processing liquid to said processed object.
[Claim 7] Are the art which supplies processing liquid to a processed object from a nozzle, and performs processing to a processed object, making a processed object hold for a pivotable maintenance means, and rotating this maintenance means, and an outside of a processed object held by said maintenance means is adjoined. And an art characterized by carrying out alignment and installing a plate member so that a surface location may become the almost same degree as a location of a front face of a processed object, and for a front face of this plate member also passing processing liquid besides a front face of a processed object according to a centrifugal force, and extending.
[Claim 8] An art which is an art according to claim 7 and is characterized by supplying processing liquid, making said nozzle rock.
[Claim 9] An art which is an art according to claim 7 or 8, and is characterized by having a process which a nozzle is located on an arbitration part of said plate member, and carries out the regurgitation of the residual processing liquid in a nozzle beforehand on this plate member before supplying processing liquid from said nozzle to a processed object.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention relates to the processor and art which improved the means at the time of washing the glass substrate concerned in more detail about the processor and art which perform substrate washing and a development to the glass substrate used for a liquid crystal display (Liquid Crystal Display:LCD).
[0002]
[Description of the Prior Art] In the manufacturing process of LCD, in order to form the thin film and electrode pattern of ITO (Indium TinOxide) on the glass substrate for LCD, the same photolithography technology as what is used for manufacture of a semiconductor device is used. With photolithography technology, it applies to the substrate which washed the photoresist, this is exposed, and negatives are developed further.
[0003] The penetrant remover is supplied and washed, in order to supply and wash a penetrant remover to a glass substrate in a substrate washing process among these processes and to flush a developer in a development process. Specifically, the thing of the glass substrate made to hold to a spin chuck which a penetrant remover is supplied and is extended all over the glass substrate according to the centrifugal force is performed, arranging the regurgitation nozzle of a penetrant remover in the center mostly, and rotating a glass substrate by the spin chuck.
[0004]
[Problem(s) to be Solved by the Invention] By the way, it is important for this penetrant remover to be supplied so that it may spread round homogeneity to the whole glass substrate surface so that the whole glass substrate surface may be washed fully and uniformly. For example, if supply of a penetrant remover becomes an ununiformity in a substrate washing process and washing unevenness arises, there is a possibility of having an adverse effect on subsequent processing, and when washing of a developer is imperfection in a development process, the heterogeneity of the pattern line breadth after development may be brought about.
[0005] However, as shown in drawing 11 (a), the regurgitation nozzle 100 of the conventional penetrant remover supplies a penetrant remover by the quiescent state in the location of glass substrate G which counters in the center mostly. Therefore, though glass substrate G is rotating with the spin chuck, in a center of rotation, a penetrant remover will be supplied from the location fixed by seeing relatively. For this reason, in this supply location, the liquid rate of flow serves as zero substantially, the stagnation arises and washing in this stagnation point A serves as imperfection as compared with other parts.
[0006] Moreover, although the penetrant remover is spirally extended all over glass substrate G according to the centrifugal force accompanying the revolution of a spin chuck as the arrow head showed drawing 11 (b), glass substrate G is a square rather than is circular. For this reason, as the dashed line arrow head showed drawing, the penetrant remover which spreads according to the centrifugal force will be shaken off by each sides G1-G4 of glass substrate G, and will scatter out of a substrate. Therefore, a penetrant remover does not spread round the each corner [of glass substrate G] G5 - G8 neighborhood, but there is also a problem that washing serves as imperfection.
[0007] This invention is made in view of the above-mentioned point, and let it be a technical problem to offer homogeneity, the processor which can fully process washing etc., and an art to a processed substrate.
[0008]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, it is

characterized by providing a maintenance revolution means to rotate a processor of this invention according to claim 1 holding a processed object, a nozzle for supplying processing liquid to a processed object which rotated with said maintenance revolution means, and a splash means to rock said nozzle to the midst to which said nozzle supplies processing liquid.
[0009] A maintenance revolution means to rotate a processor of this invention according to claim 2 holding a processed object, In case processing liquid is supplied from a nozzle for supplying processing liquid to a processed object which rotated with said maintenance revolution means, and said nozzle, while adjoining an outside of a processed object held by said maintenance revolution means Alignment of the surface location is carried out to the almost same degree as a location of a front face of a processed object. It rotates synchronizing with revolution actuation of a processed object by said maintenance revolution means, and is characterized by providing a plate member which forms a part of processing liquid flow channel at the time of supplied processing liquid spreading on a front face of a processed object according to a centrifugal force.
[0010] A processor of this invention according to claim 3 is a processor according to claim 2, and is characterized by providing further a splash means to rock said nozzle to the midst to which said nozzle supplies processing liquid.
[0011] A maintenance revolution means to rotate a processor of this invention according to claim 4 holding a processed object, In case processing liquid is supplied from a nozzle for supplying processing liquid to a processed object which rotated with said maintenance revolution means, and said nozzle, while adjoining an outside of a processed object held by said maintenance revolution means Alignment of the surface location is carried out to the almost same degree as a location of a front face of a processed object. An inner cup which rotated synchronizing with revolution actuation of a processed object by said maintenance revolution means, and was equipped with a plate member which forms a part of processing liquid flow channel at the time of supplied processing liquid spreading on a front face of a processed object according to a centrifugal force in one, It is characterized by providing an outside cup arranged so that a periphery of said inner cup may be enclosed.
[0012] A processor of this invention according to claim 5 is a processor according to claim 4, and is characterized by providing further a splash means to rock said nozzle to the midst to which said nozzle supplies processing liquid.
[0013] An art of this invention according to claim 6 is an art which supplies processing liquid to a processed object and performs processing to a processed object while rotating a processed object, and it is characterized by supplying processing liquid, fluctuating a supply location of processing liquid to said processed object.
[0014] An art of this invention according to claim 7 makes a processed object hold for a pivotable maintenance means. Are the art which supplies processing liquid to a processed object from a nozzle, and performs processing to a processed object, rotating this maintenance means, and an outside of a processed object held by said maintenance means is adjoined. And it is characterized by carrying out alignment and installing a plate member so that a surface location may become the almost same degree as a location of a front face of a processed object, and for a front face of this plate member also passing processing liquid besides a front face of a processed object according to a centrifugal force, and extending.
[0015] An art of this invention according to claim 8 is an art according to claim 7, and it is characterized by supplying processing liquid, making said nozzle rock.
[0016] An art of this invention according to claim 9 is an art according to claim 7 or 8, before it supplies processing liquid from said nozzle to a processed object, locates a nozzle on an arbitration part of said plate member, and is characterized by having a process which carries out the regurgitation of the residual processing liquid in a nozzle beforehand on this plate member.
[0017] According to the processor according to claim 1, since a nozzle is prepared rockable, a part to which processing liquid in a processed object is supplied is not fixed. Therefore, if a nozzle rocks and a regurgitation location changes even if the stagnation point arises temporarily in a certain regurgitation location, it will cancel by the revolution of an attachment component and stagnation of the stagnation point before ** and regurgitation location change will be lost. For this reason, when stagnation arises in a specific part, it can prevent that processing of washing of a processed object etc. becomes uneven.
[0018] While according to the processor according to claim 2 adjoining an outside of a processed object held by pivotable maintenance means and being prepared pivotable synchronizing with revolution actuation of a processed object by maintenance means, a plate member is prepared so that a surface

location may become almost the same as a location of a front face of a processed object. Therefore, although supplied processing liquid is protruded from each side of a processed object in case it spreads on a front face of a processed object according to a centrifugal force, it passes through a front face of a plate member in that case. Since processing liquid which passed through a front face of a plate member spreads spirally by the revolution of an attachment component, it returns on a processed object and passes through the corner top. For this reason, it is not especially said by being shaken off like before in each side of a processed object that processing of washing of a corner of a processed object etc. becomes imperfection.

[0019] According to the processor according to claim 3, since a nozzle other than said plate member is prepared rockable, stagnation in a regurgitation location of a nozzle is also lost.

[0020] While according to the processor according to claim 4 adjoining an outside of a processed object held by maintenance means and being prepared pivotable synchronizing with revolution actuation of a processed object by maintenance means, it has an inner cup equipped with a plate member prepared so that a surface location might become almost the same as a location of a front face of a processed object in one. Therefore, although supplied processing liquid is protruded from each side of a processed object in case it spreads on a front face of a processed object according to a centrifugal force, it passes through a front face of a plate member in that case. Since processing liquid which passed through a front face of a plate member spreads spirally by the revolution of an attachment component, it returns on a processed object and passes through the corner top. For this reason, it is not especially said by being shaken off like before in each side of a processed object that processing of washing of a corner of a processed object etc. becomes imperfection. Moreover, since a plate member is prepared in an inner cup in one, time and effort of manufacturing a plate member separately with an inner cup, and arranging it can be saved. And collection of processing liquid by type becomes easy by making a cup into double structure, and processing liquid can be reused easily.

[0021] According to the processor according to claim 5, since a nozzle other than said plate member is prepared rockable, stagnation in a regurgitation location of a nozzle is also lost.

[0022] In order to supply processing liquid according to the art according to claim 6, fluctuating a supply location, a part where processing liquid in a processed object is breathed out is not fixed. Therefore, if a regurgitation location changes even if the stagnation point arises temporarily in a certain regurgitation location, it will cancel by revolution of a processed object and stagnation of the stagnation point before ** and regurgitation location change will be lost. For this reason, when stagnation arises in a specific part, processing of washing of a processed object etc. does not necessarily serve as an ununiformity.

[0023] In order according to the art according to claim 7 to carry out by installing a plate member so that an outside of a processed object held by maintenance means may be adjoined and a surface location may become almost the same as a location of a front face of a processed object, a front face of this plate member also passes processing liquid which spreads according to a centrifugal force besides a front face of a processed object. And since processing liquid which passed through a front face of a plate member spreads spirally by the revolution of an attachment component, it returns on a processed object and passes through the corner top. For this reason, it is not especially said by being shaken off like before in each side of a processed object that processing of washing of a corner of a processed object etc. becomes imperfection.

[0024] In order to carry out the regurgitation of the processing liquid according to the art according to claim 8, making a nozzle rock, stagnation in a regurgitation location is also lost.

[0025] According to the art according to claim 9, before carrying out the regurgitation of the penetrant remover from a nozzle to a processed object, a nozzle is located on an arbitration part of a plate member, and it has a process which carries out the regurgitation of the residual processing liquid in a nozzle beforehand on this plate member. For this reason, at the time of regurgitation initiation, residual processing liquid becomes bubble-like, and is breathed out on a processed object, and it can prevent that processing unevenness, such as washing unevenness, arises by that cause.

[0026]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained based on a drawing. First, spreading and the whole development system structure where the processor of this invention is used are explained based on drawing 1 .

[0027] As shown in drawing 1 , ahead [of this spreading and development system 1], the automatic-loader-and-unloader section which carries out taking-out close [of the glass substrate G] to spreading and the development system 1 is prepared. Glass substrate G is prepared in the automatic loader and

unloader 4 which returns glass substrate G to which processing ended the cassette installation base 3 in which align the cassette C which it contained 25 sheets at a time in a predetermined location, and it is made to lay, and glass substrate G which should be processed from each cassette C in ejection, spreading, and the development system 1 to each cassette C by this automatic-loader-and-unloader section. The automatic loader and unloader 4 of a graphic display moves in the array direction of Cassette C by transit of a main part 5, and returns glass substrate G for glass substrate G to ejection and each cassette C from each cassette C with the piece of board-like pincettes 6 carried in the main part 5. Moreover, the substrate alignment member 7 which holds the four corners of glass substrate G and performs alignment is formed in the both sides of a pincette 6.

[0028] In the center section of spreading and the development system 1, the conveyance ways 10 and 11 of the shape of a corridor arranged at the longitudinal direction are formed on the straight line through the 1st delivery section 12, and the various processors for performing each processing to glass substrate G are arranged at the both sides of these conveyance ways 10 and 11.

[0029] If it is in spreading and the development system 1 of a graphic display, while carrying out brush washing of the glass substrate G, two washing stations 16 for high voltage jet water to wash are installed in the 1 side of the conveyance way 10 side by side, for example. Moreover, across the conveyance way 10, two sets of developers 17 are installed in an opposite hand side by side, and two sets of heating apparatus 18 are accumulated and prepared next to it.

[0030] Moreover, before applying resist liquid to glass substrate G, the adhesion device 20 which carries out non-dense water treatment of the glass substrate G is formed in the 1 side of the conveyance way 11, and the cooling equipment 21 for cooling is arranged at the lower part of this adhesion device 20. Moreover, next to these adhesion devices 20 and cooling equipment 21, heating apparatus 22 puts upon two trains [two] at a time, and is arranged. Moreover, the resist coater 23 which forms a resist film in the front face of glass substrate G is arranged across the conveyance way 11 by applying resist liquid to the front face of glass substrate G in an opposite hand. Although a graphic display is not carried out, the aligner for exposing a predetermined detailed pattern through the 2nd delivery section 28 on the resist film formed on glass substrate G etc. is formed in the flank of these coaters 23. The 2nd delivery section 28 is equipped with the taking-out close pincette 29 and the delivery base 30 for carrying in and taking out glass substrate G.

[0031] In the both sides of the conveyance ways 10 and 11, each above processors 16-18, and 20-23 turn the gate of glass substrate G inside, and they are arranged by each. In order that the 1st transport device 25 may convey glass substrate G between the automatic-loader-and-unloader section 2, each processors 16-18, and the 1st delivery section 12, it moves in the conveyance way 10 top, and in order that the 2nd transport device 26 may convey glass substrate G between the 1st delivery section 12, the 2nd delivery section 28, and each processors 20-23, it moves in the conveyance way 11 top.

[0032] When it has the arms 27 and 27 of a vertical couple, respectively and each processors 16-18, and 20-23 are accessed, each transport devices 25 and 26 take out glass substrate G [finishing / processing] from the chamber of each processor with one arm 27, and they are constituted so that glass substrate G before processing may be carried in in a chamber with the arm 27 of another side.

[0033] the part where drawing 2 - drawing 4 showed the 1st operation gestalt which applied this invention to the developer 17 among the processors which constitute above-mentioned spreading and development system 1, and drawing 2 looked at this developer 17 from the transverse plane -- a cross section and drawing 3 are that plan. The spin chuck 32 constituted possible [vertical movement in the rise-and-fall cylinder 60] pivotable by the drive motor 31 is formed in the core of a developer 17. The upper surface of this spin chuck 32 is constituted so that the adsorption maintenance of the glass substrate G may be changed into a level condition by vacuum adsorption etc. Moreover, the ball bearing 61 as a stopper is inserted between the drive motor 31 and the rise-and-fall cylinder 60. That is, in case a spin chuck 32 descends in the rise-and-fall cylinder 60, a spin chuck 32 descends [the lower part of a drive motor 31] less than [this] in the upper surface of a ball bearing 61.

[0034] The bottom container 33 is arranged under this spin chuck 32. Moreover, the outside cup 34 is arranged so that the periphery of a spin chuck 32 may be enclosed, and the inner cup 35 is arranged between the bottom container 33 and the outside cup 34.

[0035] The outside cup 34 and the inner cup 35 are connected by the connection member 36, and go up and down these outside cup 34 and the inner cup 35 in the rise-and-fall cylinder 38 based on the command of a control section 37. The upper part of the outside cup 34 and the inner cup 35 is inclined and prepared inside so that it may become narrow, as it goes upwards, respectively, the diameter of

upper bed opening of the outside cup 34 is larger than that of the inner cup 35, and the diameter of these upper bed openings is formed in the magnitude which is dropped in a cup, changing glass substrate G into a level condition, and can be held.

[0036] The bottom container 33 is equipped with the ramp 39 which inclines downward toward outside from a core, and the saucer section 40 arranged at the periphery. The tubed standing-up wall 42 is formed in the base of the saucer section 40, and the standing-up wall 42 intervenes between the outside cup 34 and the inner cup 35. Moreover, the ramp of the inner cup 35 has extended on the periphery of the standing-up wall 42 over the standing-up wall 42. Thereby, flowing fluid flows the ramp of the inner cup 35 into the outside room 43 divided with the standing-up wall 42 of the saucer section 40.

[0037] The exhaust port 44 for exhausting the inside of a cup is established in the rear-face side of the ramp 39 of the bottom container 33, and the exhaust air pump (a graphic display is omitted) is connected to the exhaust port 44. The effluent opening 46 is formed in the lower part of the inside room 45 divided with the standing-up wall 42 of the saucer section 40, and the drain port 47 is formed in the lower part of the outside room 43. And the regeneration device 49 in which a used developer is regenerated through the recovery pipe 48 is connected to the effluent opening 46. The regeneration device 49 consists of a vapor-liquid-separation device 50 which carries out vapor liquid separation, and an impurity clearance device 51 in which the impurity in a used developer is removed, and is connected to the developer hold tank 52. The drain port 47 is connected to the recovery tank which is not illustrated.

[0038] The developer regurgitation device 53 for carrying out the regurgitation of the developer to the up 1 side of a cup to the front face of glass substrate G is arranged, and the soaping-machine style 54 for carrying out the regurgitation of the penetrant remover to the front face of glass substrate G is arranged in the other sides. Moreover, as shown in drawing 3 , this side of the upper part of a cup, and back, the rails 56 and 57 for conveyance are formed. The motor 58 for conveyance is attached in the developer regurgitation device 53, and the developer regurgitation device 53 is conveyed along with the rails 56 and 57 for conveyance in the upper part in a cup by actuation of the conveyance motor 58 under control by the control section 37. And a developer is supplied to this developer regurgitation device 53 from the developer hold tank 52 through the basis of control of a control section 37, and a pump 62. Moreover, two or more developer regurgitation nozzles 71 are attached in the maintenance rod which has been arranged horizontally and which is not illustrated at the developer regurgitation device 53.

[0039] As for the soaping-machine style 54, a penetrant remover (for example, pure water) is supplied from the penetrant remover tank 67 through the basis of control of a control section 37, and a pump 66. As shown in drawing 4 , this soaping-machine style 54 is connected with 54d of revolution actuators, and has support arm 54b prepared in rotation freedom focusing on end face section 54a, and penetrant remover regurgitation nozzle 54c supported by the end of this support arm 54b. Although 54d of revolution actuators drives support arm 54b, it rotates end face section 54a as a center and locates penetrant remover regurgitation nozzle 54c in the part corresponding to a center of glass substrate G mostly by control of a control section 37 If the regurgitation of a penetrant remover is started, it will be controlled to carry out longitudinal slide movement along the rotation direction (the direction of arrow head X-X of drawing) a center [end face section 54a], and, thereby, penetrant remover regurgitation nozzle 54c will rock. Although penetrant remover regurgitation nozzle 54c is made to rock by placing in a fixed position penetrant remover regurgitation nozzle 54c to support arm 54b, and controlling support arm 54b by this operation gestalt as mentioned above in this way It is good also as a configuration which supports through the link mechanism which can make only this nozzle 54c rock in case penetrant remover regurgitation nozzle 54c is supported to support arm 54b, controls actuation of direct penetrant remover regurgitation nozzle 54c by the control section 37, and is made to rock.

[0040] Next, actuation is explained. as it is carried in in a developer 17, glass substrate G held by the spin chuck 32 descends and the fictitious outline of drawing 2 showed, the outside cup 34 and the inner cup 35 go up to the highest location -- having -- the developer regurgitation device 53 -- glass substrate G -- mostly, to a center, it is conveyed and is stood still. And glass substrate G held by the spin chuck 32 rotates, and a developer is breathed out from the developer regurgitation nozzle 71 of the developer regurgitation device 53 to this glass substrate G. Moreover, the developer which scatters from the periphery of glass substrate G is collected and reused from the effluent opening 46 in the inside of the inner cup 35.

[0041] Next, glass substrate G held by the spin chuck 32 descends, and the outside cup 34 and the inner cup 35 descend to the lowest location. and support arm 54b from which glass substrate G held by the spin chuck 32 is made into a quiescent state, and constitutes the soaping-machine style 54 -- rotating -

- penetrant remover regurgitation nozzle 54c -- glass substrate G -- it is mostly arranged in the center. Next, at this time, although glass substrate G held by the spin chuck 32 rotates and a penetrant remover (pure water) is supplied from penetrant remover regurgitation nozzle 54c to glass substrate G, as shown in drawing 4 , support arm 54b operates forward and backward in the range of a predetermined angle along that rotation direction, consequently penetrant remover regurgitation nozzle 54c rocks with this operation gestalt. For this reason, in drawing 4 , it is not necessarily mostly fixed to a center, and the regurgitation location of penetrant remover regurgitation nozzle 54c is a splash range between the locations (a B point and C point) of glass substrate G from which it separated from a center (A point) and this center, and will always change during supply of a penetrant remover. Since the regurgitation location of a penetrant remover is not fixed, the stagnation in the regurgitation location of a penetrant remover does not arise. Since glass substrate G is rotating by the spin chuck 32, the breathed-out penetrant remover spreads spirally toward the periphery side of glass substrate G according to the centrifugal force. In addition, the rinse which scatters from the periphery of glass substrate G is discarded from a drain port 47 through between the inner cup 35 and the outside cups 34.

[0042] If supply of a penetrant remover is completed, support arm 54b will rotate to the above and hard flow from the bottom of its heart almost in glass substrate G, and penetrant remover regurgitation nozzle 54c will be conveyed out of a cup. And a high-speed revolution is carried out, glass substrate G held by the spin chuck 32 shakes off, and desiccation is performed.

[0043] In addition, glass substrate G is made into a quiescent state, although the developer was breathed out in the development mentioned above, rotating glass substrate G, even if it makes it make it run the glass substrate G top which stood the developer regurgitation device 68 still, it is, and it is **.

[0044] Next, the 2nd operation gestalt of this invention is explained based on drawing 5 - drawing 8 . It is the structure of carrying plate member 32a which functions as an attachment component with a spin chuck 32 while rotating synchronizing with this spin chuck 32 on a spin chuck 32 with this operation gestalt rather than laying direct glass substrate G on a spin chuck 32 unlike the 1st operation gestalt, and making this plate member 32a supporting glass substrate G.

[0045] As shown in drawing 5 - drawing 7 , while this plate member 32a is formed in the disc form where a diameter is smaller than the diameter of upper bed opening of the inner cup 35, concave section 32b of the abbreviation square of magnitude which can hold glass substrate G is formed in the front face. Moreover, the location of surface 32c of the circumference of this concave section 32b becomes almost the same as the location of the front face of held glass substrate G, and this concave section 32b is formed in the depth which can form the same flat surface, when glass substrate G is held. Since it is a portion used as the passage of the penetrant remover which spreads spirally with the revolution of a spin chuck 32, when it doubles with the front face of glass substrate G, as for surface 32c of this plate member 32a, it is desirable but that it is the same plane as much as possible, and as long as penetrant remover passage can be formed, there may be some differences of elevation. "It is almost the same" is [above-mentioned] semantics included also when there are some differences of elevation in this way.

[0046] The operation of this operation gestalt is as follows. First, glass substrate G held by the spin chuck 32 in the condition of having held in concave section 32b of the above-mentioned plate member 32a is dropped, the outside cup 34 and the inner cup 35 are raised to the highest location, and the regurgitation of the developer is carried out according to the developer regurgitation device 53. The process so far is the same as the 1st above-mentioned operation gestalt.

[0047] Next, glass substrate G held by the spin chuck 32 descends after termination of the above-mentioned process, and the outside cup 34 and the inner cup 35 descend to the lowest location. next, support arm 54b which constitutes the soaping-machine style 54 -- rotating -- penetrant remover regurgitation nozzle 54c -- glass substrate G -- it is mostly arranged in the center. Next, glass substrate G held by the spin chuck 32 rotates with plate member 32a, and a penetrant remover (pure water) is supplied from penetrant remover regurgitation nozzle 54c to glass substrate G. By the revolution of glass substrate G, as shown in drawing 8 , the supplied penetrant remover spreads the front-face top of glass substrate G spirally. Therefore, a penetrant remover overflows also into the exterior of each periphery sides G1-G4 of glass substrate G. However, according to this operation gestalt, plate member 32a is also rotating together with glass substrate G by the revolution of a spin chuck 32, and since the location of the front face of glass substrate G is almost the same as the location of surface 32c of plate member 32a of a parenthesis, the penetrant remover overflowing into the exterior of each periphery sides G1-G4 of glass substrate G can pass also through the surface 32c top of this plate member 32a. And since how to spread is spiral, the penetrant remover overflowing from

each periphery sides G1-G4 returns in the direction of glass substrate G, is cut, and passes through each corner [of glass substrate G] G5 - G8 top.
[0048] Therefore, the supplied penetrant remover will spread in homogeneity at the whole glass substrate G also including each corners G5-G8 of glass substrate G. In addition, the penetrant remover which scatters from the periphery of plate member 32a is discarded from a drain port 47 through between the inner cup 35 and the outside cups 34.
[0049] If supply of a penetrant remover is completed, support arm 54b will rotate to the above and hard flow from the bottom of its heart almost in glass substrate G, and penetrant remover regurgitation nozzle 54c will be conveyed out of a cup. And a high-speed revolution is carried out, glass substrate G held by the spin chuck 32 shakes off, and desiccation is performed.
[0050] Drawing 9 and drawing 10 show the important section of the 3rd operation gestalt of this invention. With this operation gestalt, it replaces with plate member 32a of the 2nd operation gestalt, and while projecting horizontally toward the inner direction in the upper bed of the inner cup 35, it has flange 35a of the sense in one. With this operation gestalt, this flange 35a is equivalent to the plate member prepared in the inner cup 35 in one. When it is formed so that the configuration of inner circumference marginal 35e may serve as magnitude of glass substrate G, and a square of the almost same magnitude by plane view as shown in drawing 10 , and glass substrate G is contained in inner circumference marginal 35e of this square, this flange 35a becomes together with glass substrate G, and forms one flat surface. Moreover, it connects with drive-motor 35c through coupling device 35b, and this inner cup 35 is a configuration rotated independently in the outside cup 34. In this point, it differs also from the 1st above-mentioned operation gestalt. In addition, this inner cup 35 is controlled through coupling device 35b to rotate synchronizing with a spin chuck 32. Moreover, the tubed covering 63 is formed so that the axis of rotation holding a spin chuck 32 may be enclosed under the spin chuck 32, and processing liquid invades into the axis of rotation. However, unlike the 1st above-mentioned operation gestalt, penetrant remover regurgitation nozzle 54c is not prepared rockable.
[0051] The operation of this operation gestalt is as follows. First, the process until it drops glass substrate G held by the spin chuck 32, it raises the outside cup 34 and the inner cup 35 to the highest location and it carries out the regurgitation of the developer according to the developer regurgitation device 53 is the same as the 1st above-mentioned operation gestalt.
[0052] Next, glass substrate G held by the spin chuck 32 descends after termination of the above-mentioned process, and the outside cup 34 and the inner cup 35 also descend. While carrying out alignment so that glass substrate G held by the spin chuck 32 may be located in inner circumference marginal 35e of the inner cup 35 at this time, it adjusts so that the location of the front face of glass substrate G and the location of the front face of flange 35a of the inner cup 35 may become almost the same. In addition, it is the same as that of the 2nd above-mentioned operation gestalt that it is the semantics included also when there is the difference of elevation of the "almost same" some here.
[0053] next, support arm 54b which constitutes the soaping-machine style 54 -- rotating -- penetrant remover regurgitation nozzle 54c -- glass substrate G -- it is mostly arranged in the center. Next, although glass substrate G held by the spin chuck 32 rotates and a penetrant remover (pure water) is supplied from penetrant remover regurgitation nozzle 54c to glass substrate G, with this operation gestalt, the inner cup 35 also rotates together at this time. By the revolution of glass substrate G, the supplied penetrant remover spreads the front-face top of glass substrate G spirally. Therefore, although a penetrant remover overflows also into the exterior of each periphery sides G1-G4 of glass substrate G According to this operation gestalt, since the location of the front face of glass substrate G is [that the inner cup 35 is also rotating together] almost the same as the location of the front face of the flange 35a, The penetrant remover overflowing into the exterior of each periphery sides G1-G4 of glass substrate G passes also through the front-face top of this flange 35a like the 2nd operation gestalt. And since how to spread is spiral, the penetrant remover overflowing from each periphery sides G1-G4 returns in the direction of glass substrate G, and passes through each corner [of glass substrate G] G5 - G8 top.
[0054] Therefore, the supplied penetrant remover will spread in homogeneity at the whole glass substrate G also including each corners G5-G8 of glass substrate G. The penetrant remover which scatters from the periphery of flange 35a of the inner cup 35 is discarded from a drain port 47 through between the inner cup 35 and the outside cups 34.
[0055] If supply of a penetrant remover is completed, support arm 54b will rotate to the above and hard flow from the bottom of its heart almost in glass substrate G, and penetrant remover regurgitation nozzle

54c will be conveyed out of a cup. And a high-speed revolution is carried out, glass substrate G held by the spin chuck 32 shakes off, and desiccation is performed. In addition, with this operation gestalt, the inner cup 35 also rotates together in this case.

[0056] In addition, although each supplies the penetrant remover with the 2nd and 3rd above-mentioned operation gestalten, without making penetrant remover regurgitation nozzle 54c rock, in order to abolish the stagnation in a regurgitation location, it is desirable like the 1st operation gestalt to prepare penetrant remover regurgitation nozzle 54c rockable. Since such a configuration, then the stagnation in a regurgitation location are also lost, a penetrant remover can be supplied more to homogeneity at the whole glass substrate G.

[0057] moreover, with the 2nd and 3rd above-mentioned operation gestalten Since it has plate member 32a or flange 35a on the outside of glass substrate G, Rotate support arm 54b of the soaping-machine style 54, and penetrant remover regurgitation nozzle 54c is located on the arbitration part of this plate member 32a or flange 35a. The process which makes a penetrant remover once breathe out penetrant remover regurgitation nozzle 54c here before [glass substrate G] making it mostly located in a center section can be added. Since the residual penetrant remover which remained in penetrant remover regurgitation nozzle 54c will become foamy and will be breathed out beforehand by this, a penetrant remover newer than the time of regurgitation initiation can be supplied, and the homogeneity of a cleaning effect can be raised.

[0058] In addition, this invention is not limited to the above-mentioned gestalt of operation. for example, as a plate member which can form the passage of the penetrant remover which overflows the periphery of glass substrate G Although prepared in the thing and inner cup which are fixed to the above-mentioned spin chuck at one, others and these are what was completely formed independently. For example, it moves up and down through upper bed opening of an inner cup, and the plate member which descends from an upper part location if needed, and is arranged on the outside of glass substrate G can also be adopted. Moreover, although the above-mentioned explanation explains this invention based on the example applied to the developer, it is also possible to apply this invention to the washing station and resist coater for other processors, for example, substrate washing. Moreover, for example, as a substrate, naturally, this invention is applicable also about substrates, such as not only glass substrate [for LCD] G but a semiconductor wafer.

[0059]

[Effect of the Invention] According to the processor of this invention according to claim 1, since the nozzle is prepared rockable, the part where the processing liquid in a processed object is breathed out is not fixed. For this reason, when the stagnation arises in a specific part, it can prevent that processing of washing of a processed object etc. becomes uneven.

[0060] While according to the processor of this invention according to claim 2 adjoining the outside of a processed object and rotating synchronizing with revolution actuation of a processed object, the plate member is prepared so that a surface location may become almost the same as the location of the front face of a processed object. Therefore, since the supplied processing liquid passes also through the front face of a plate member with breadth spirally on the front face of a processed object according to a centrifugal force, it can return on a processed object and can pass through the corner top. For this reason, it is not especially said by being shaken off like before in each side of a processed object that processing of the corner of a processed object becomes imperfection.

[0061] According to the processor of this invention according to claim 3, since the nozzle other than said plate member is prepared rockable, processing [of the corner of a processed object] does not become inadequate, and the stagnation in the regurgitation location of a nozzle is also lost.

[0062] While according to the processor of this invention according to claim 4 adjoining the outside of a processed object and rotating synchronizing with revolution actuation of a processed object, it has the inner cup equipped with the plate member prepared so that a surface location might become almost the same as the location of the front face of a processed object in one. Therefore, since the supplied processing liquid passes also through the front face of a plate member with breadth spirally on the front face of a processed object according to a centrifugal force, it can return on a processed object and can pass through the corner top. For this reason, it is not especially said by being shaken off like before in each side of a processed object that processing of the corner of a processed object becomes imperfection. Moreover, since the plate member is prepared in the inner cup in one, the time and effort of manufacturing a plate member separately with an inner cup, and arranging it can be saved.

[0063] According to the processor of this invention according to claim 5, since the nozzle other than

said plate member is prepared rockable, processing [of the corner of a processed object] does not become inadequate, and the stagnation in the regurgitation location of a nozzle is also lost.

[0064] In order to supply processing liquid according to the art of this invention according to claim 6, fluctuating a processing liquid supply location, when the stagnation arises in a specific part, processing of a processed object does not necessarily serve as an ununiformity.

[0065] In order according to the art of this invention according to claim 7 to process by installing a plate member so that the outside of a processed object may be adjoined and a surface location may become almost the same as the location of the front face of a processed object, the processing liquid which spreads according to a centrifugal force passes also through the front face of this plate member besides the front face of a processed object, returns on a processed object further and passes through that corner top. For this reason, it is not especially said by being shaken off like before in each side of a processed object that processing of the corner of a processed object becomes imperfection.

[0066] In order to carry out the regurgitation of the processing liquid according to the art of this invention according to claim 8, making a nozzle rock, the stagnation in a regurgitation location is also lost.

[0067] According to the art of this invention according to claim 9, before carrying out the regurgitation of the processing liquid from a nozzle to a processed object, it has the process which carries out the regurgitation of the residual processing liquid in a nozzle beforehand on a plate member. For this reason, at the time of regurgitation initiation, residual processing liquid becomes bubble-like, and is breathed out on a processed object, and it can prevent that processing unevenness arises by that cause.

[Translation done.]

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TECHNICAL FIELD

[The technical field to which invention belongs] This invention relates to the processor and art which improved the means at the time of washing the glass substrate concerned in more detail about the processor and art which perform substrate washing and a development to the glass substrate used for a liquid crystal display (Liquid Crystal Display:LCD).

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PRIOR ART

[Description of the Prior Art] In the manufacturing process of LCD, in order to form the thin film and electrode pattern of ITO (Indium TinOxide) on the glass substrate for LCD, the same photolithography technology as what is used for manufacture of a semiconductor device is used. With photolithography technology, it applies to the substrate which washed the photoresist, this is exposed, and negatives are developed further.
[0003] The penetrant remover is supplied and washed, in order to supply and wash a penetrant remover to a glass substrate in a substrate washing process among these processes and to flush a developer in a development process. Specifically, the thing of the glass substrate made to hold to a spin chuck which a penetrant remover is supplied and is extended all over the glass substrate according to the centrifugal force is performed, arranging the regurgitation nozzle of a penetrant remover in the center mostly, and rotating a glass substrate by the spin chuck.

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EFFECT OF THE INVENTION

[Effect of the Invention] According to the processor of this invention according to claim 1, since the nozzle is prepared rockable, the part where the processing liquid in a processed object is breathed out is not fixed. For this reason, when the stagnation arises in a specific part, it can prevent that processing of washing of a processed object etc. becomes uneven.
[0060] While according to the processor of this invention according to claim 2 adjoining the outside of a processed object and rotating synchronizing with revolution actuation of a processed object, the plate member is prepared so that a surface location may become almost the same as the location of the front face of a processed object. Therefore, since the supplied processing liquid passes also through the front face of a plate member with breadth spirally on the front face of a processed object according to a centrifugal force, it can return on a processed object and can pass through the corner top. For this reason, it is not especially said by being shaken off like before in each side of a processed object that processing of the corner of a processed object becomes imperfection.
[0061] According to the processor of this invention according to claim 3, since the nozzle other than said plate member is prepared rockable, processing [of the corner of a processed object] does not become inadequate, and the stagnation in the regurgitation location of a nozzle is also lost.
[0062] While according to the processor of this invention according to claim 4 adjoining the outside of a processed object and rotating synchronizing with revolution actuation of a processed object, it has the inner cup equipped with the plate member prepared so that a surface location might become almost the same as the location of the front face of a processed object in one. Therefore, since the supplied processing liquid passes also through the front face of a plate member with breadth spirally on the front face of a processed object according to a centrifugal force, it can return on a processed object and can pass through the corner top. For this reason, it is not especially said by being shaken off like before in each side of a processed object that processing of the corner of a processed object becomes imperfection. Moreover, since the plate member is prepared in the inner cup in one, the time and effort of manufacturing a plate member separately with an inner cup, and arranging it can be saved.
[0063] According to the processor of this invention according to claim 5, since the nozzle other than said plate member is prepared rockable, processing [of the corner of a processed object] does not become inadequate, and the stagnation in the regurgitation location of a nozzle is also lost.
[0064] In order to supply processing liquid according to the art of this invention according to claim 6, fluctuating a processing liquid supply location, when the stagnation arises in a specific part, processing of a processed object does not necessarily serve as an ununiformity.
[0065] In order according to the art of this invention according to claim 7 to process by installing a plate member so that the outside of a processed object may be adjoined and a surface location may become almost the same as the location of the front face of a processed object, the processing liquid which spreads according to a centrifugal force passes also through the front face of this plate member besides the front face of a processed object, returns on a processed object further and passes through that corner top. For this reason, it is not especially said by being shaken off like before in each side of a processed object that processing of the corner of a processed object becomes imperfection.
[0066] In order to carry out the regurgitation of the processing liquid according to the art of this invention according to claim 8, making a nozzle rock, the stagnation in a regurgitation location is also lost.
[0067] According to the art of this invention according to claim 9, before carrying out the regurgitation of the processing liquid from a nozzle to a processed object, it has the process which carries out the regurgitation of the residual processing liquid in a nozzle beforehand on a plate member. For this reason,

at the time of regurgitation initiation, residual processing liquid becomes bubble-like, and is breathed out on a processed object, and it can prevent that processing unevenness arises by that cause.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] By the way, it is important for this penetrant remover to be supplied so that it may spread round homogeneity to the whole glass substrate surface so that the whole glass substrate surface may be washed fully and uniformly. For example, if supply of a penetrant remover becomes an ununiformity in a substrate washing process and washing unevenness arises, there is a possibility of having an adverse effect on subsequent processing, and when washing of a developer is imperfection in a development process, the heterogeneity of the pattern line breadth after development may be brought about.
[0005] However, as shown in drawing 11 (a), the regurgitation nozzle 100 of the conventional penetrant remover supplies a penetrant remover by the quiescent state in the location of glass substrate G which counters in the center mostly. Therefore, though glass substrate G is rotating with the spin chuck, in a center of rotation, a penetrant remover will be supplied from the location fixed by seeing relatively. For this reason, in this supply location, the liquid rate of flow serves as zero substantially, the stagnation arises and washing in this stagnation point A serves as imperfection as compared with other parts.
[0006] Moreover, although the penetrant remover is spirally extended all over glass substrate G according to the centrifugal force accompanying the revolution of a spin chuck as the arrow head showed drawing 11 (b), glass substrate G is a square rather than is circular. For this reason, as the dashed line arrow head showed drawing, the penetrant remover which spreads according to the centrifugal force will be shaken off by each sides G1-G4 of glass substrate G, and will scatter out of a substrate. Therefore, a penetrant remover does not spread round the each corner [of glass substrate G] G5 - G8 neighborhood, but there is also a problem that washing serves as imperfection.
[0007] This invention is made in view of the above-mentioned point, and let it be a technical problem to offer homogeneity, the processor which can fully process washing etc., and an art to a processed substrate.

[Translation done.]

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MEANS

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, it is characterized by providing a maintenance revolution means to rotate a processor of this invention according to claim 1 holding a processed object, a nozzle for supplying processing liquid to a processed object which rotated with said maintenance revolution means, and a splash means to rock said nozzle to the midst to which said nozzle supplies processing liquid.
[0009] A maintenance revolution means to rotate a processor of this invention according to claim 2 holding a processed object, In case processing liquid is supplied from a nozzle for supplying processing liquid to a processed object which rotated with said maintenance revolution means, and said nozzle, while adjoining an outside of a processed object held by said maintenance revolution means Alignment of the surface location is carried out to the almost same degree as a location of a front face of a processed object. It rotates synchronizing with revolution actuation of a processed object by said maintenance revolution means, and is characterized by providing a plate member which forms a part of processing liquid flow channel at the time of supplied processing liquid spreading on a front face of a processed object according to a centrifugal force.
[0010] A processor of this invention according to claim 3 is a processor according to claim 2, and is characterized by providing further a splash means to rock said nozzle to the midst to which said nozzle supplies processing liquid.
[0011] A maintenance revolution means to rotate a processor of this invention according to claim 4 holding a processed object, In case processing liquid is supplied from a nozzle for supplying processing liquid to a processed object which rotated with said maintenance revolution means, and said nozzle, while adjoining an outside of a processed object held by said maintenance revolution means Alignment of the surface location is carried out to the almost same degree as a location of a front face of a processed object. An inner cup which rotated synchronizing with revolution actuation of a processed object by said maintenance revolution means, and was equipped with a plate member which forms a part of processing liquid flow channel at the time of supplied processing liquid spreading on a front face of a processed object according to a centrifugal force in one, It is characterized by providing an outside cup arranged so that a periphery of said inner cup may be enclosed.
[0012] A processor of this invention according to claim 5 is a processor according to claim 4, and is characterized by providing further a splash means to rock said nozzle to the midst to which said nozzle supplies processing liquid.
[0013] An art of this invention according to claim 6 is an art which supplies processing liquid to a processed object and performs processing to a processed object while rotating a processed object, and it is characterized by supplying processing liquid, fluctuating a supply location of processing liquid to said processed object.
[0014] An art of this invention according to claim 7 makes a processed object hold for a pivotable maintenance means. Are the art which supplies processing liquid to a processed object from a nozzle, and performs processing to a processed object, rotating this maintenance means, and an outside of a processed object held by said maintenance means is adjoined. And it is characterized by carrying out alignment and installing a plate member so that a surface location may become the almost same degree as a location of a front face of a processed object, and for a front face of this plate member also passing processing liquid besides a front face of a processed object according to a centrifugal force, and extending.
[0015] An art of this invention according to claim 8 is an art according to claim 7, and it is characterized by supplying processing liquid, making said nozzle rock.

[0016] An art of this invention according to claim 9 is an art according to claim 7 or 8, before it supplies processing liquid from said nozzle to a processed object, locates a nozzle on an arbitration part of said plate member, and is characterized by having a process which carries out the regurgitation of the residual processing liquid in a nozzle beforehand on this plate member.
[0017] According to the processor according to claim 1, since a nozzle is prepared rockable, a part to which processing liquid in a processed object is supplied is not fixed. Therefore, if a nozzle rocks and a regurgitation location changes even if the stagnation point arises temporarily in a certain regurgitation location, it will cancel by the revolution of an attachment component and stagnation of the stagnation point before ** and regurgitation location change will be lost. For this reason, when stagnation arises in a specific part, it can prevent that processing of washing of a processed object etc. becomes uneven.
[0018] While according to the processor according to claim 2 adjoining an outside of a processed object held by pivotable maintenance means and being prepared pivotable synchronizing with revolution actuation of a processed object by maintenance means, a plate member is prepared so that a surface location may become almost the same as a location of a front face of a processed object. Therefore, although supplied processing liquid is protruded from each side of a processed object in case it spreads on a front face of a processed object according to a centrifugal force, it passes through a front face of a plate member in that case. Since processing liquid which passed through a front face of a plate member spreads spirally by the revolution of an attachment component, it returns on a processed object and passes through the corner top. For this reason, it is not especially said by being shaken off like before in each side of a processed object that processing of washing of a corner of a processed object etc. becomes imperfection.
[0019] According to the processor according to claim 3, since a nozzle other than said plate member is prepared rockable, stagnation in a regurgitation location of a nozzle is also lost.
[0020] While according to the processor according to claim 4 adjoining an outside of a processed object held by maintenance means and being prepared pivotable synchronizing with revolution actuation of a processed object by maintenance means, it has an inner cup equipped with a plate member prepared so that a surface location might become almost the same as a location of a front face of a processed object in one. Therefore, although supplied processing liquid is protruded from each side of a processed object in case it spreads on a front face of a processed object according to a centrifugal force, it passes through a front face of a plate member in that case. Since processing liquid which passed through a front face of a plate member spreads spirally by the revolution of an attachment component, it returns on a processed object and passes through the corner top. For this reason, it is not especially said by being shaken off like before in each side of a processed object that processing of washing of a corner of a processed object etc. becomes imperfection. Moreover, since a plate member is prepared in an inner cup in one, time and effort of manufacturing a plate member separately with an inner cup, and arranging it can be saved. And collection of processing liquid by type becomes easy by making a cup into double structure, and processing liquid can be reused easily.
[0021] According to the processor according to claim 5, since a nozzle other than said plate member is prepared rockable, stagnation in a regurgitation location of a nozzle is also lost.
[0022] In order to supply processing liquid according to the art according to claim 6, fluctuating a supply location, a part where processing liquid in a processed object is breathed out is not fixed. Therefore, if a regurgitation location changes even if the stagnation point arises temporarily in a certain regurgitation location, it will cancel by revolution of a processed object and stagnation of the stagnation point before ** and regurgitation location change will be lost. For this reason, when stagnation arises in a specific part, processing of washing of a processed object etc. does not necessarily serve as an ununiformity.
[0023] In order according to the art according to claim 7 to carry out by installing a plate member so that an outside of a processed object held by maintenance means may be adjoined and a surface location may become almost the same as a location of a front face of a processed object, a front face of this plate member also passes processing liquid which spreads according to a centrifugal force besides a front face of a processed object. And since processing liquid which passed through a front face of a plate member spreads spirally by the revolution of an attachment component, it returns on a processed object and passes through the corner top. For this reason, it is not especially said by being shaken off like before in each side of a processed object that processing of washing of a corner of a processed object etc. becomes imperfection.
[0024] In order to carry out the regurgitation of the processing liquid according to the art according to claim 8, making a nozzle rock, stagnation in a regurgitation location is also lost.

[0025] According to the art according to claim 9, before carrying out the regurgitation of the penetrant remover from a nozzle to a processed object, a nozzle is located on an arbitration part of a plate member, and it has a process which carries out the regurgitation of the residual processing liquid in a nozzle beforehand on this plate member. For this reason, at the time of regurgitation initiation, residual processing liquid becomes bubble-like, and is breathed out on a processed object, and it can prevent that processing unevenness, such as washing unevenness, arises by that cause.

[0026]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained based on a drawing. First, spreading and the whole development system structure where the processor of this invention is used are explained based on drawing 1 .

[0027] As shown in drawing 1 , ahead [of this spreading and development system 1], the automatic-loader-and-unloader section which carries out taking-out close [of the glass substrate G] to spreading and the development system 1 is prepared. Glass substrate G is prepared in the automatic loader and unloader 4 which returns glass substrate G to which processing ended the cassette installation base 3 in which align the cassette C which it contained 25 sheets at a time in a predetermined location, and it is made to lay, and glass substrate G which should be processed from each cassette C in ejection, spreading, and the development system 1 to each cassette C by this automatic-loader-and-unloader section. The automatic loader and unloader 4 of a graphic display moves in the array direction of Cassette C by transit of a main part 5, and returns glass substrate G for glass substrate G to ejection and each cassette C from each cassette C with the piece of board-like pincettes 6 carried in the main part 5. Moreover, the substrate alignment member 7 which holds the four corners of glass substrate G and performs alignment is formed in the both sides of a pincette 6.

[0028] In the center section of spreading and the development system 1, the conveyance ways 10 and 11 of the shape of a corridor arranged at the longitudinal direction are formed on the straight line through the 1st delivery section 12, and the various processors for performing each processing to glass substrate G are arranged at the both sides of these conveyance ways 10 and 11.

[0029] If it is in spreading and the development system 1 of a graphic display, while carrying out brush washing of the glass substrate G, two washing stations 16 for high voltage jet water to wash are installed in the 1 side of the conveyance way 10 side by side, for example. Moreover, across the conveyance way 10, two sets of developers 17 are installed in an opposite hand side by side, and two sets of heating apparatus 18 are accumulated and prepared next to it.

[0030] Moreover, before applying resist liquid to glass substrate G, the adhesion device 20 which carries out non-dense water treatment of the glass substrate G is formed in the 1 side of the conveyance way 11, and the cooling equipment 21 for cooling is arranged at the lower part of this adhesion device 20. Moreover, next to these adhesion devices 20 and cooling equipment 21, heating apparatus 22 puts upon two trains [two] at a time, and is arranged. Moreover, the resist coater 23 which forms a resist film in the front face of glass substrate G is arranged across the conveyance way 11 by applying resist liquid to the front face of glass substrate G in an opposite hand. Although a graphic display is not carried out, the aligner for exposing a predetermined detailed pattern through the 2nd delivery section 28 on the resist film formed on glass substrate G etc. is formed in the flank of these coaters 23. The 2nd delivery section 28 is equipped with the taking-out close pincette 29 and the delivery base 30 for carrying in and taking out glass substrate G.

[0031] In the both sides of the conveyance ways 10 and 11, each above processors 16-18, and 20-23 turn the gate of glass substrate G inside, and they are arranged by each. In order that the 1st transport device 25 may convey glass substrate G between the automatic-loader-and-unloader section 2, each processors 16-18, and the 1st delivery section 12, it moves in the conveyance way 10 top, and in order that the 2nd transport device 26 may convey glass substrate G between the 1st delivery section 12, the 2nd delivery section 28, and each processors 20-23, it moves in the conveyance way 11 top.

[0032] When it has the arms 27 and 27 of a vertical couple, respectively and each processors 16-18, and 20-23 are accessed, each transport devices 25 and 26 take out glass substrate G [finishing / processing] from the chamber of each processor with one arm 27, and they are constituted so that glass substrate G before processing may be carried in in a chamber with the arm 27 of another side.

[0033] the part where drawing 2 - drawing 4 showed the 1st operation gestalt which applied this invention to the developer 17 among the processors which constitute above-mentioned spreading and development system 1, and drawing 2 looked at this developer 17 from the transverse plane -- a cross section and drawing 3 are that plan. The spin chuck 32 constituted possible [vertical movement in the

rise-and-fall cylinder 60] pivotable by the drive motor 31 is formed in the core of a developer 17. The upper surface of this spin chuck 32 is constituted so that the adsorption maintenance of the glass substrate G may be changed into a level condition by vacuum adsorption etc. Moreover, the ball bearing 61 as a stopper is inserted between the drive motor 31 and the rise-and-fall cylinder 60. That is, in case a spin chuck 32 descends in the rise-and-fall cylinder 60, a spin chuck 32 descends [the lower part of a drive motor 31] less than [this] in the upper surface of a ball bearing 61.

[0034] The bottom container 33 is arranged under this spin chuck 32. Moreover, the outside cup 34 is arranged so that the periphery of a spin chuck 32 may be enclosed, and the inner cup 35 is arranged between the bottom container 33 and the outside cup 34.

[0035] The outside cup 34 and the inner cup 35 are connected by the connection member 36, and go up and down these outside cup 34 and the inner cup 35 in the rise-and-fall cylinder 38 based on the command of a control section 37. The upper part of the outside cup 34 and the inner cup 35 is inclined and prepared inside so that it may become narrow, as it goes upwards, respectively, the diameter of upper bed opening of the outside cup 34 is larger than that of the inner cup 35, and the diameter of these upper bed openings is formed in the magnitude which is dropped in a cup, changing glass substrate G into a level condition, and can be held.

[0036] The bottom container 33 is equipped with the ramp 39 which inclines downward toward outside from a core, and the saucer section 40 arranged at the periphery. The tubed standing-up wall 42 is formed in the base of the saucer section 40, and the standing-up wall 42 intervenes between the outside cup 34 and the inner cup 35. Moreover, the ramp of the inner cup 35 has extended on the periphery of the standing-up wall 42 over the standing-up wall 42. Thereby, flowing fluid flows the ramp of the inner cup 35 into the outside room 43 divided with the standing-up wall 42 of the saucer section 40.

[0037] The exhaust port 44 for exhausting the inside of a cup is established in the rear-face side of the ramp 39 of the bottom container 33, and the exhaust air pump (a graphic display is omitted) is connected to the exhaust port 44. The effluent opening 46 is formed in the lower part of the inside room 45 divided with the standing-up wall 42 of the saucer section 40, and the drain port 47 is formed in the lower part of the outside room 43. And the regeneration device 49 in which a used developer is regenerated through the recovery pipe 48 is connected to the effluent opening 46. The regeneration device 49 consists of a vapor-liquid-separation device 50 which carries out vapor liquid separation, and an impurity clearance device 51 in which the impurity in a used developer is removed, and is connected to the developer hold tank 52. The drain port 47 is connected to the recovery tank which is not illustrated.

[0038] The developer regurgitation device 53 for carrying out the regurgitation of the developer to the up 1 side of a cup to the front face of glass substrate G is arranged, and the soaping-machine style 54 for carrying out the regurgitation of the penetrant remover to the front face of glass substrate G is arranged in the other sides. Moreover, as shown in drawing 3 , this side of the upper part of a cup, and back, the rails 56 and 57 for conveyance are formed. The motor 58 for conveyance is attached in the developer regurgitation device 53, and the developer regurgitation device 53 is conveyed along with the rails 56 and 57 for conveyance in the upper part in a cup by actuation of the conveyance motor 58 under control by the control section 37. And a developer is supplied to this developer regurgitation device 53 from the developer hold tank 52 through the basis of control of a control section 37, and a pump 62. Moreover, two or more developer regurgitation nozzles 71 are attached in the maintenance rod which has been arranged horizontally and which is not illustrated at the developer regurgitation device 53.

[0039] As for the soaping-machine style 54, a penetrant remover (for example, pure water) is supplied from the penetrant remover tank 67 through the basis of control of a control section 37, and a pump 66. As shown in drawing 4 , this soaping-machine style 54 is connected with 54d of revolution actuators, and has support arm 54b prepared in rotation freedom focusing on end face section 54a, and penetrant remover regurgitation nozzle 54c supported by the end of this support arm 54b. Although 54d of revolution actuators drives support arm 54b, it rotates end face section 54a as a center and makes the part corresponding to a center of glass substrate G carry out penetrant remover regurgitation nozzle 54c <DP N=0006> location mostly by control of a control section 37 If the regurgitation of a penetrant remover is started, it will be controlled to carry out longitudinal slide movement along the rotation direction (the direction of arrow head X-X of drawing) a center [end face section 54a], and, thereby, penetrant remover regurgitation nozzle 54c will rock. Although penetrant remover regurgitation nozzle 54c is made to rock by placing in a fixed position penetrant remover regurgitation nozzle 54c to support arm 54b, and controlling support arm 54b by this operation gestalt as mentioned above in this way It is good also as a configuration which supports through the link mechanism which can make only this nozzle

54c rock in case penetrant remover regurgitation nozzle 54c is supported to support arm 54b, controls actuation of direct penetrant remover regurgitation nozzle 54c by the control section 37, and is made to rock.

[0040] Next, actuation is explained. as it is carried in in a developer 17, glass substrate G held by the spin chuck 32 descends and the fictitious outline of drawing 2 showed, the outside cup 34 and the inner cup 35 go up to the highest location -- having -- the developer regurgitation device 53 -- glass substrate G -- mostly, to a center, it is conveyed and is stood still. And glass substrate G held by the spin chuck 32 rotates, and a developer is breathed out from the developer regurgitation nozzle 71 of the developer regurgitation device 53 to this glass substrate G. Moreover, the developer which scatters from the periphery of glass substrate G is collected and reused from the effluent opening 46 in the inside of the inner cup 35.

[0041] Next, glass substrate G held by the spin chuck 32 descends, and the outside cup 34 and the inner cup 35 descend to the lowest location. and support arm 54b from which glass substrate G held by the spin chuck 32 is made into a quiescent state, and constitutes the soaping-machine style 54 -- rotating -- penetrant remover regurgitation nozzle 54c -- glass substrate G -- it is mostly arranged in the center. Next, at this time, although glass substrate G held by the spin chuck 32 rotates and a penetrant remover (pure water) is supplied from penetrant remover regurgitation nozzle 54c to glass substrate G, as shown in drawing 4 , support arm 54b operates forward and backward in the range of a predetermined angle along that rotation direction, consequently penetrant remover regurgitation nozzle 54c rocks with this operation gestalt. For this reason, in drawing 4 , it is not necessarily mostly fixed to a center, and the regurgitation location of penetrant remover regurgitation nozzle 54c is a splash range between the locations (a B point and C point) of glass substrate G from which it separated from a center (A point) and this center, and will always change during supply of a penetrant remover. Since the regurgitation location of a penetrant remover is not fixed, the stagnation in the regurgitation location of a penetrant remover does not arise. Since glass substrate G is rotating by the spin chuck 32, the breathed-out penetrant remover spreads spirally toward the periphery side of glass substrate G according to the centrifugal force. In addition, the rinse which scatters from the periphery of glass substrate G is discarded from a drain port 47 through between the inner cup 35 and the outside cups 34.

[0042] If supply of a penetrant remover is completed, support arm 54b will rotate to the above and hard flow from the bottom of its heart almost in glass substrate G, and penetrant remover regurgitation nozzle 54c will be conveyed out of a cup. And a high-speed revolution is carried out, glass substrate G held by the spin chuck 32 shakes off, and desiccation is performed.

[0043] In addition, glass substrate G is made into a quiescent state, although the developer was breathed out in the development mentioned above, rotating glass substrate G, even if it makes it make it run the glass substrate G top which stood the developer regurgitation device 68 still, it is, and it is **.

[0044] Next, the 2nd operation gestalt of this invention is explained based on drawing 5 - drawing 8 . It is the structure of carrying plate member 32a which functions as an attachment component with a spin chuck 32 while rotating synchronizing with this spin chuck 32 on a spin chuck 32 with this operation gestalt rather than laying direct glass substrate G on a spin chuck 32 unlike the 1st operation gestalt, and making this plate member 32a supporting glass substrate G.

[0045] As shown in drawing 5 - drawing 7 , while this plate member 32a is formed in the disc form where a diameter is smaller than the diameter of upper bed opening of the inner cup 35, concave section 32b of the abbreviation square of magnitude which can hold glass substrate G is formed in the front face. Moreover, the location of surface 32c of the circumference of this concave section 32b becomes almost the same as the location of the front face of held glass substrate G, and this concave section 32b is formed in the depth which can form the same flat surface, when glass substrate G is held. Since it is a portion used as the passage of the penetrant remover which spreads spirally with the revolution of a spin chuck 32, when it doubles with the front face of glass substrate G, as for surface 32c of this plate member 32a, it is desirable but that it is the same plane as much as possible, and as long as penetrant remover passage can be formed, there may be some differences of elevation. "It is almost the same" is [above-mentioned] semantics included also when there are some differences of elevation in this way.

[0046] The operation of this operation gestalt is as follows. First, glass substrate G held by the spin chuck 32 in the condition of having held in concave section 32b of the above-mentioned plate member 32a is dropped, the outside cup 34 and the inner cup 35 are raised to the highest location, and the regurgitation of the developer is carried out according to the developer regurgitation device 53. The process so far is the same as the 1st above-mentioned operation gestalt.

[0047] Next, glass substrate G held by the spin chuck 32 descends after termination of the above-mentioned process, and the outside cup 34 and the inner cup 35 descend to the lowest location. next, support arm 54b which constitutes the soaping-machine style 54 -- rotating -- penetrant remover regurgitation nozzle 54c -- glass substrate G -- it is mostly arranged in the center. Next, glass substrate G held by the spin chuck 32 rotates with plate member 32a, and a penetrant remover (pure water) is supplied from penetrant remover regurgitation nozzle 54c to glass substrate G. By the revolution of glass substrate G, as shown in drawing 8 , the supplied penetrant remover spreads the front-face top of glass substrate G spirally. Therefore, a penetrant remover overflows also into the exterior of each periphery sides G1-G4 of glass substrate G. However, according to this operation gestalt, plate member 32a is also rotating together with glass substrate G by the revolution of a spin chuck 32, and since the location of the front face of glass substrate G is almost the same as the location of surface 32c of plate member 32a of a parenthesis, the penetrant remover overflowing into the exterior of each periphery sides G1-G4 of glass substrate G can pass also through the surface 32c top of this plate member 32a. And since how to spread is spiral, the penetrant remover overflowing from each periphery sides G1-G4 returns in the direction of glass substrate G, is cut, and passes through each corner [of glass substrate G] G5 - G8 top.

[0048] Therefore, the supplied penetrant remover will spread in homogeneity at the whole glass substrate G also including each corners G5-G8 of glass substrate G. In addition, the penetrant remover which scatters from the periphery of plate member 32a is discarded from a drain port 47 through between the inner cup 35 and the outside cups 34.

[0049] If supply of a penetrant remover is completed, support arm 54b will rotate to the above and hard flow from the bottom of its heart almost in glass substrate G, and penetrant remover regurgitation nozzle 54c will be conveyed out of a cup. And a high-speed revolution is carried out, glass substrate G held by the spin chuck 32 shakes off, and desiccation is performed.

[0050] Drawing 9 and drawing 10 show the important section of the 3rd operation gestalt of this invention. With this operation gestalt, it replaces with plate member 32a of the 2nd operation gestalt, and while projecting horizontally toward the inner direction in the upper bed of the inner cup 35, it has flange 35a of the sense in one. With this operation gestalt, this flange 35a is equivalent to the plate member prepared in the inner cup 35 in one. When it is formed so that the configuration of inner circumference marginal 35e may serve as magnitude of glass substrate G, and a square of the almost same magnitude by plane view as shown in drawing 10 , and glass substrate G is contained in inner circumference marginal 35e of this square, this flange 35a becomes together with glass substrate G, and forms one flat surface. Moreover, it connects with drive-motor 35c through coupling device 35b, and this inner cup 35 is a configuration rotated independently in the outside cup 34. In this point, it differs also from the 1st above-mentioned operation gestalt. In addition, this inner cup 35 is controlled through coupling device 35b to rotate synchronizing with a spin chuck 32. Moreover, the tubed covering 63 is formed so that the axis of rotation holding a spin chuck 32 may be enclosed under the spin chuck 32, and processing liquid invades into the axis of rotation. However, unlike the 1st above-mentioned operation gestalt, penetrant remover regurgitation nozzle 54c is not prepared rockable.

[0051] The operation of this operation gestalt is as follows. First, the process until it drops glass substrate G held by the spin chuck 32, it raises the outside cup 34 and the inner cup 35 to the highest location and it carries out the regurgitation of the developer according to the developer regurgitation device 53 is the same as the 1st above-mentioned operation gestalt.

[0052] Next, glass substrate G held by the spin chuck 32 descends after termination of the above-mentioned process, and the outside cup 34 and the inner cup 35 also descend. While carrying out alignment so that glass substrate G held by the spin chuck 32 may be located in inner circumference marginal 35e of the inner cup 35 at this time, it adjusts so that the location of the front face of glass substrate G and the location of the front face of flange 35a of the inner cup 35 may become almost the same. In addition, it is the same as that of the 2nd above-mentioned operation gestalt that it is the semantics included also when there is the difference of elevation of the "almost same" some here.

[0053] next, support arm 54b which constitutes the soaping-machine style 54 -- rotating -- penetrant remover regurgitation nozzle 54c -- glass substrate G -- it is mostly arranged in the center. Next, although glass substrate G held by the spin chuck 32 rotates and a penetrant remover (pure water) is supplied from penetrant remover regurgitation nozzle 54c to glass substrate G, with this operation gestalt, the inner cup 35 also rotates together at this time. By the revolution of glass substrate G, the supplied penetrant remover spreads the front-face top of glass substrate G spirally. Therefore, although

a penetrant remover overflows also into the exterior of each periphery sides G1-G4 of glass substrate G According to this operation gestalt, since the location of the front face of glass substrate G is [that the inner cup 35 is also rotating together] almost the same as the location of the front face of the flange 35a, The penetrant remover overflowing into the exterior of each periphery sides G1-G4 of glass substrate G passes also through the front-face top of this flange 35a like the 2nd operation gestalt. And since how to spread is spiral, the penetrant remover overflowing from each periphery sides G1-G4 returns in the direction of glass substrate G, and passes through each corner [of glass substrate G] G5 - G8 top.

[0054] Therefore, the supplied penetrant remover will spread in homogeneity at the whole glass substrate G also including each corners G5-G8 of glass substrate G. The penetrant remover which scatters from the periphery of flange 35a of the inner cup 35 is discarded from a drain port 47 through between the inner cup 35 and the outside cups 34.

[0055] If supply of a penetrant remover is completed, support arm 54b will rotate to the above and hard flow from the bottom of its heart almost in glass substrate G, and penetrant remover regurgitation nozzle 54c will be conveyed out of a cup. And a high-speed revolution is carried out, glass substrate G held by the spin chuck 32 shakes off, and desiccation is performed. In addition, with this operation gestalt, the inner cup 35 also rotates together in this case.

[0056] In addition, although each supplies the penetrant remover with the 2nd and 3rd above-mentioned operation gestalten, without making penetrant remover regurgitation nozzle 54c rock, in order to abolish the stagnation in a regurgitation location, it is desirable like the 1st operation gestalt to prepare penetrant remover regurgitation nozzle 54c rockable. Since such a configuration, then the stagnation in a regurgitation location are also lost, a penetrant remover can be supplied more to homogeneity at the whole glass substrate G.

[0057] moreover, with the 2nd and 3rd above-mentioned operation gestalten Since it has plate member 32a or flange 35a on the outside of glass substrate G, Rotate support arm 54b of the soaping-machine style 54, and penetrant remover regurgitation nozzle 54c is located on the arbitration part of this plate member 32a or flange 35a. The process which makes a penetrant remover once breathe out penetrant remover regurgitation nozzle 54c here before [glass substrate G] making it mostly located in a center section can be added. Since the residual penetrant remover which remained in penetrant remover regurgitation nozzle 54c will become foamy and will be breathed out beforehand by this, a penetrant remover newer than the time of regurgitation initiation can be supplied, and the homogeneity of a cleaning effect can be raised.

[0058] In addition, this invention is not limited to the above-mentioned gestalt of operation. for example, as a plate member which can form the passage of the penetrant remover which overflows the periphery of glass substrate G Although prepared in the thing and inner cup which are fixed to the above-mentioned spin chuck at one, others and these are what was completely formed independently. For example, it moves up and down through upper bed opening of an inner cup, and the plate member which descends from an upper part location if needed, and is arranged on the outside of glass substrate G can also be adopted. Moreover, although the above-mentioned explanation explains this invention based on the example applied to the developer, it is also possible to apply this invention to the washing station and resist coater for other processors, for example, substrate washing. Moreover, for example, as a substrate, naturally, this invention is applicable also about substrates, such as not only glass substrate [for LCD] G but a semiconductor wafer.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the perspective diagram of the spreading and the development system by which the processor of this invention is used.
[Drawing 2] the developer concerning the 1st operation gestalt of this invention was seen from the transverse plane -- it is a cross section a part.
[Drawing 3] It is the plan of the developer shown in drawing 2 .
[Drawing 4] It is drawing for explaining actuation of the 1st operation gestalt.
[Drawing 5] the developer concerning the 2nd operation gestalt of this invention was seen from the transverse plane -- it is a cross section a part.
[Drawing 6] It is the plan of the developer shown in drawing 5 .
[Drawing 7] It is a perspective diagram for explaining the details of a plate member.
[Drawing 8] It is drawing for explaining actuation of the 2nd operation gestalt.
[Drawing 9] It is drawing showing the important section of the developer concerning the 3rd operation gestalt of this invention.
[Drawing 10] It is the appearance perspective diagram showing the outline configuration of an inner cup.
[Drawing 11] It is drawing for explaining the trouble of conventional equipment.
[Description of Notations]
17 Developer
32 Spin Chuck
32a Plate member
32c Front face
35 Inner Cup
35a Flange
54c Penetrant remover regurgitation nozzle
G Glass substrate G

[Translation done.]

* NOTICES *

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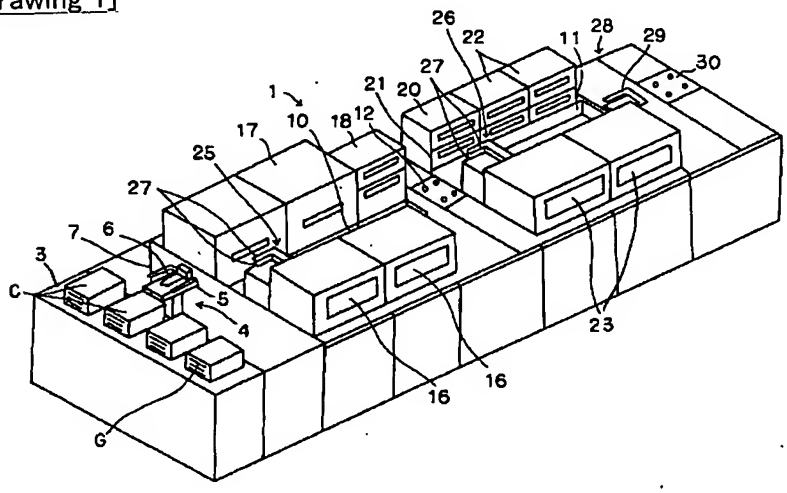
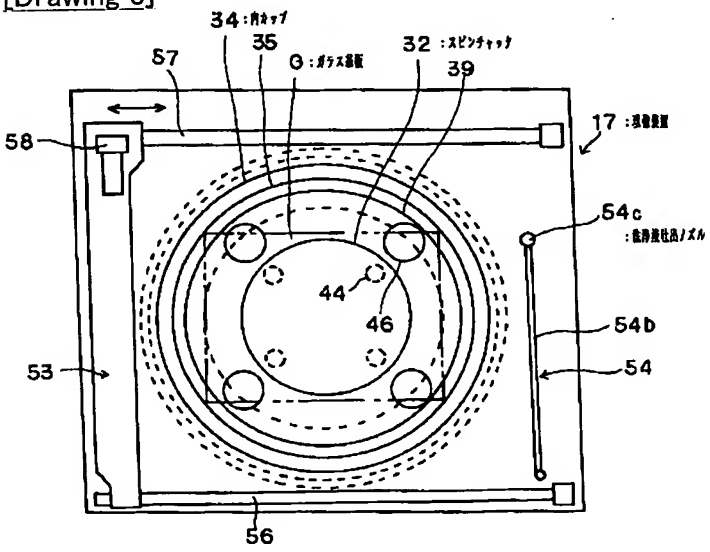
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

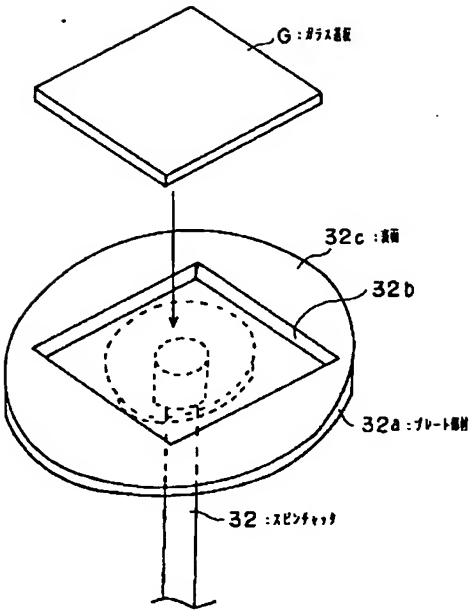
[Drawing 1]



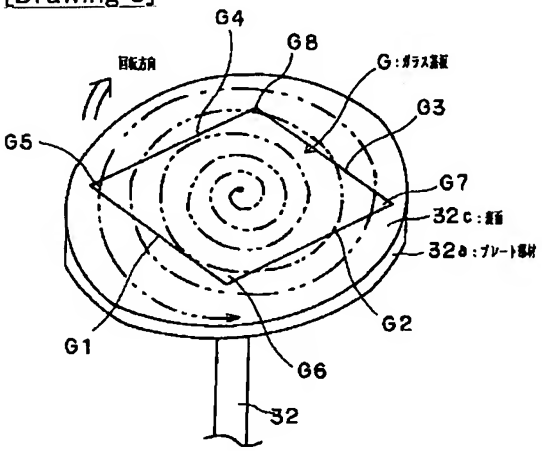
[Drawing 3]



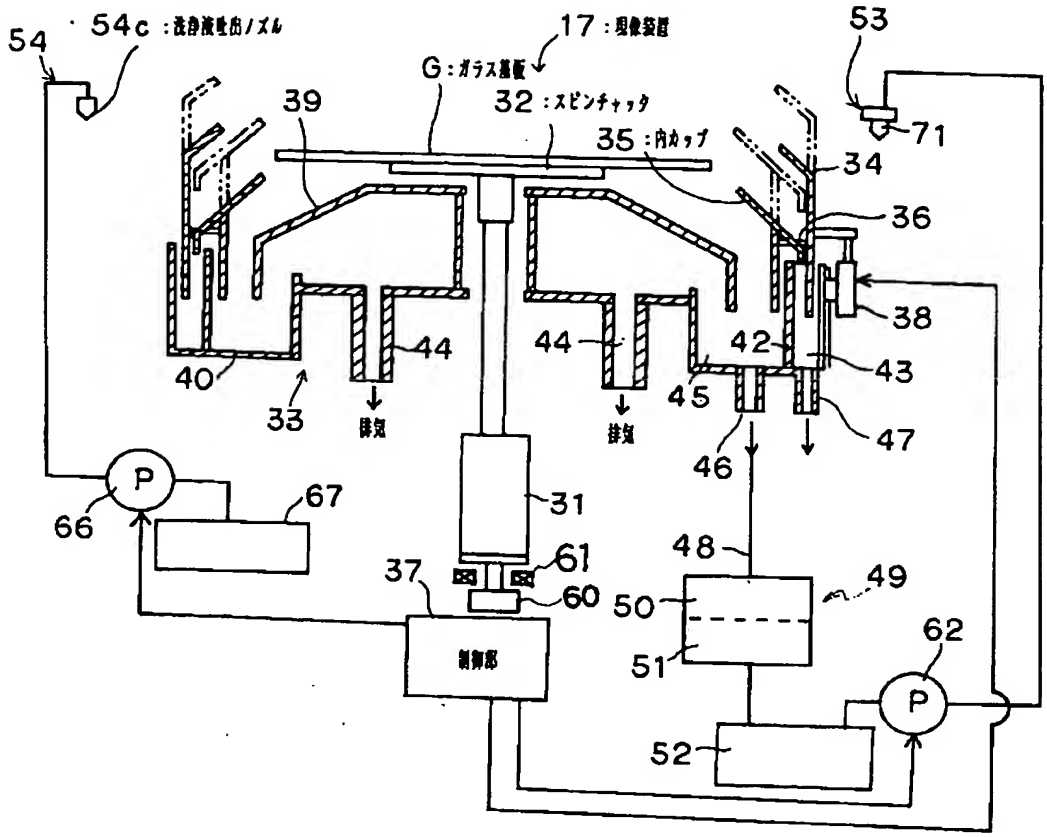
[Drawing 7]



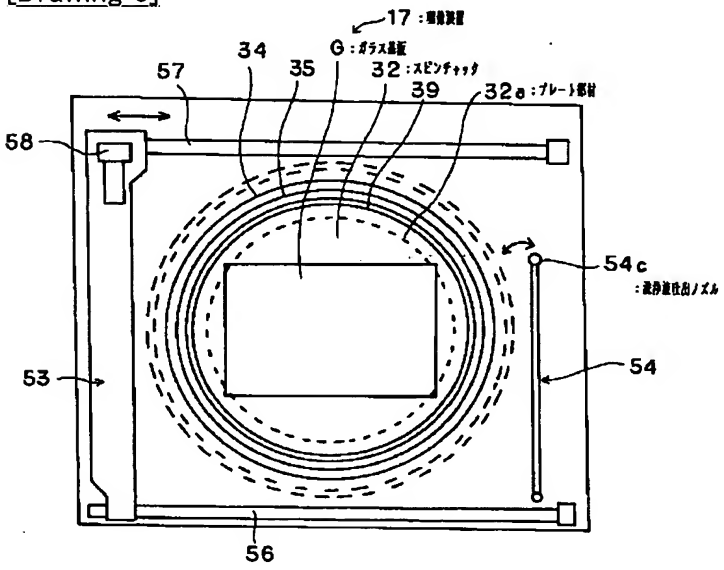
[Drawing 8]



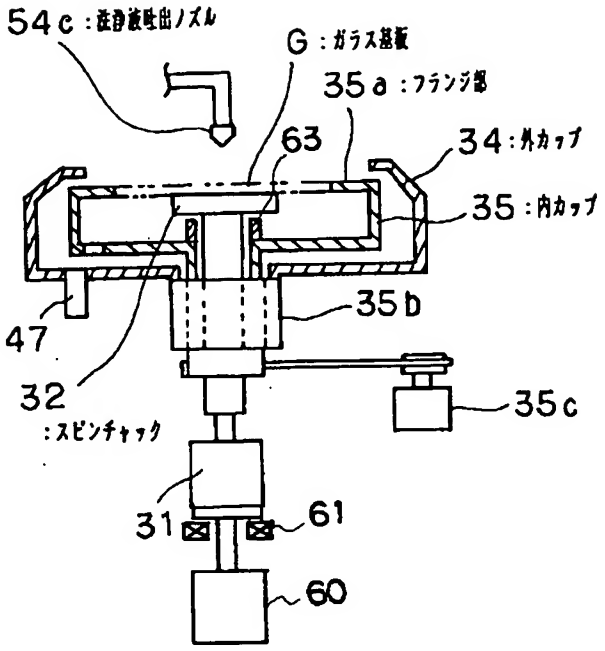
[Drawing 2]



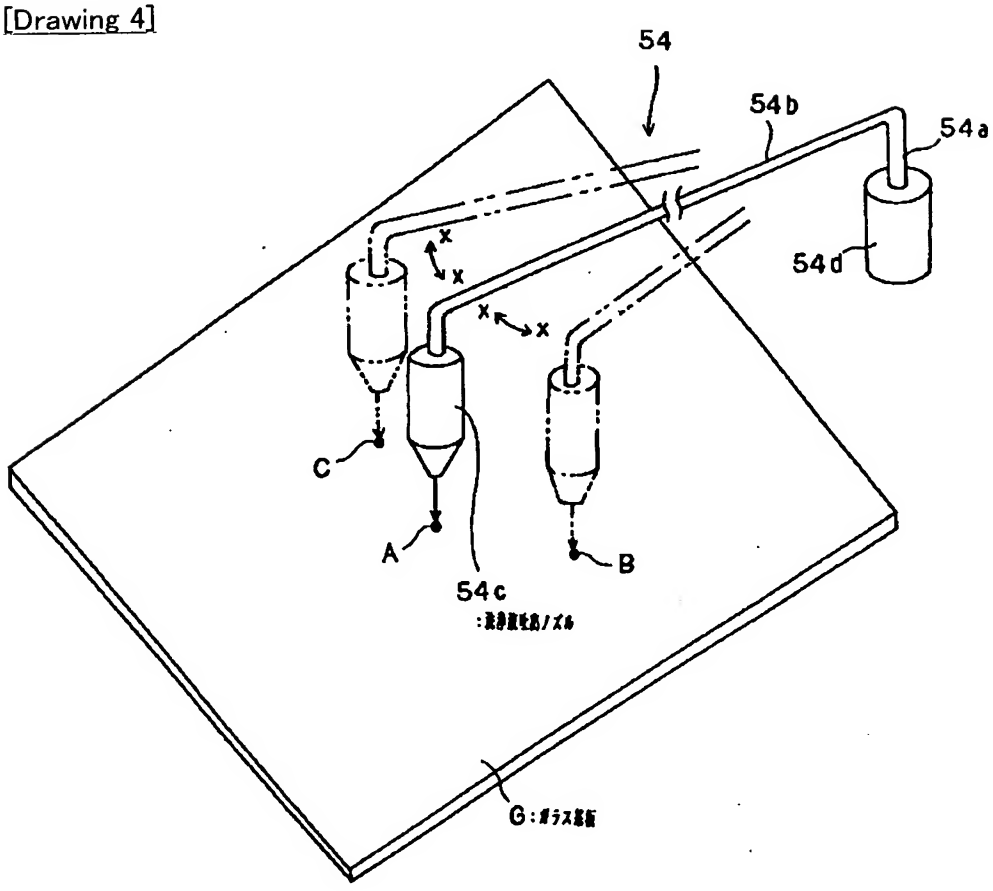
[Drawing 6]



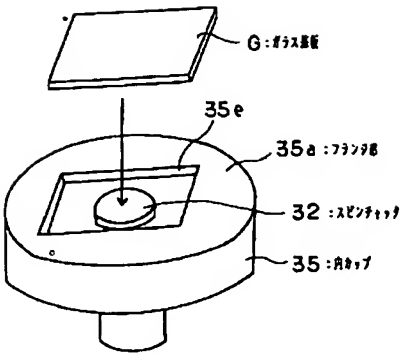
[Drawing 9]



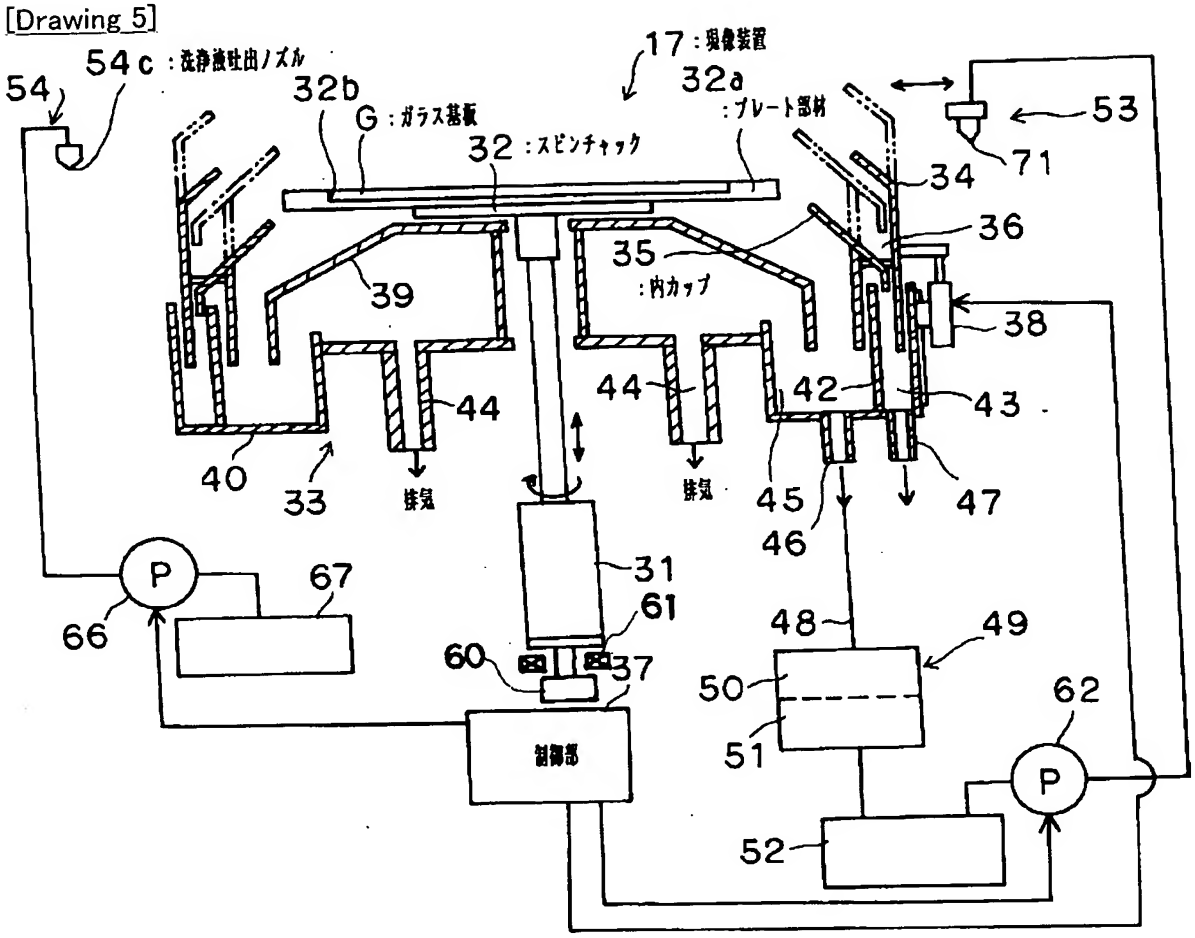
[Drawing 4]



[Drawing 10]

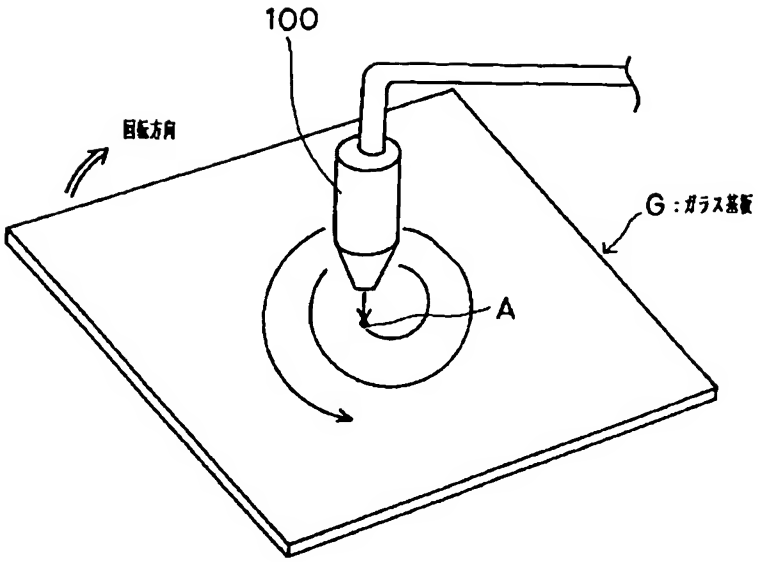


[Drawing 5]



[Drawing 11]

(a)



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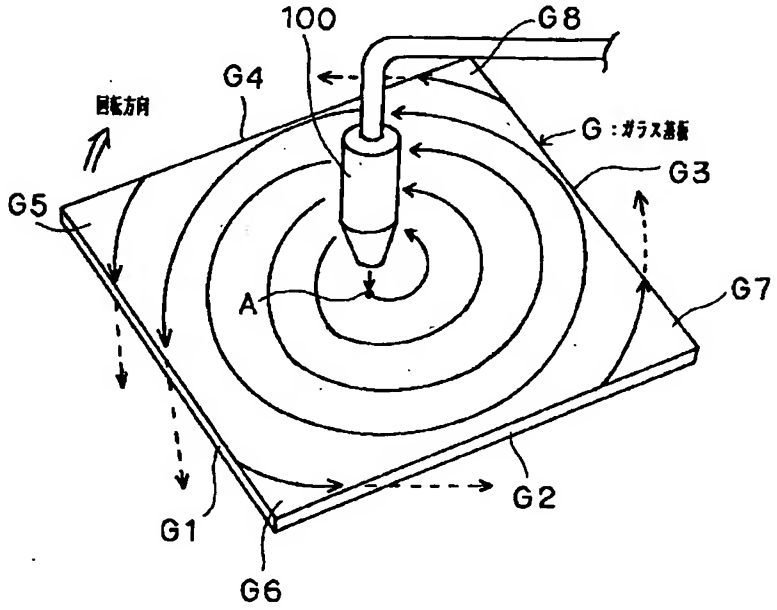

[Translation done.]

* NOTICES *

CORRECTION OR AMENDMENT

[Official Gazette Type] Printing of amendment by the convention of 2 of Article 17 of patent law
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B05D 1/40
B08B 3/02
H01L 21/304 643

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11/08
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B08B 3/02 D
H01L 21/304 643 A

[Procedure amendment]
[Filing Date] June 20, Heisei 13 (2001. 6.20)
[Procedure amendment 1]
[Document to be Amended] Description
[Item(s) to be Amended] Claim
[Method of Amendment] Modification
[Proposed Amendment]
[Claim(s)]
[Claim 1] A maintenance revolution means to rotate holding a processed object,
A nozzle for supplying processing liquid to a processed object which rotated with said maintenance revolution means,
A processor characterized by providing a splash means to rock said nozzle to the midst to which said nozzle supplies processing liquid.
[Claim 2] A maintenance revolution means to rotate holding a processed object,
A nozzle for supplying processing liquid to a processed object which rotated with said maintenance revolution means,
In case processing liquid is supplied from said nozzle, while adjoining an outside of a processed object held by said maintenance revolution means Alignment of the surface location is carried out to the almost same degree as a location of a front face of a processed object. A processor which rotates synchronizing with revolution actuation of a processed object by said maintenance revolution means, and is characterized by providing a plate member which forms a part of processing liquid flow channel at the

time of supplied processing liquid spreading on a front face of a processed object according to a centrifugal force.
[Claim 3] A processor characterized by providing further a splash means to be a processor according to claim 2 and to rock said nozzle to the midst to which said nozzle supplies processing liquid.
[Claim 4] A maintenance revolution means to rotate holding a processed object,
A nozzle for supplying processing liquid to a processed object which rotated with said maintenance revolution means,
In case processing liquid is supplied from said nozzle, while adjoining an outside of a processed object held by said maintenance revolution means Alignment of the surface location is carried out to the almost same degree as a location of a front face of a processed object. An inner cup which rotated synchronizing with revolution actuation of a processed object by said maintenance revolution means, and was equipped with a plate member which forms a part of processing liquid flow channel at the time of supplied processing liquid spreading on a front face of a processed object according to a centrifugal force in one,
A processor characterized by providing an outside cup arranged so that a periphery of said inner cup may be enclosed.
[Claim 5] A processor characterized by providing further a splash means to be a processor according to claim 4 and to rock said nozzle to the midst to which said nozzle supplies processing liquid.
[Claim 6] It is the art which supplies processing liquid to a processed object and performs processing to a processed object, rotating a processed object,
An art characterized by supplying processing liquid, fluctuating a supply location of processing liquid to said processed object.
[Claim 7] It is the art which supplies processing liquid to a processed object from a nozzle, and performs processing to a processed object, making a processed object hold for a pivotable maintenance means, and rotating this maintenance means,
An art characterized by carrying out alignment and installing a plate member so that an outside of a processed object held by said maintenance means may be adjoined and a surface location may become the almost same degree as a location of a front face of a processed object, and for a front face of this plate member also passing processing liquid besides a front face of a processed object according to a centrifugal force, and extending.
[Claim 8] An art which is an art according to claim 7 and is characterized by supplying processing liquid, making said nozzle rock.
[Claim 9] An art which is an art according to claim 7 or 8, and is characterized by having a process which a nozzle is located on an arbitration part of said plate member, and carries out the regurgitation of the residual processing liquid in a nozzle beforehand on this plate member before supplying processing liquid from said nozzle to a processed object.
[Claim 10] In a processor which supplies and processes processing liquid to a rotating substrate;
A nozzle which carries out the regurgitation of said processing liquid,
A processor which is made to carry out relative displacement of said nozzle and substrate, and is characterized by providing a migration device which moves a supply location of processing liquid to a substrate so that it may become two or more locations of a location of a center position and others almost of a substrate in case this nozzle supplies processing liquid.
[Claim 11] Supply of said processing liquid in said two or more locations of a location of a center position and others almost is a processor according to claim 10 characterized by not being simultaneous.
[Claim 12] Said processing liquid supplied by said migration device is a processor according to claim 10 characterized by moving in round trip and being supplied mostly in two or more locations of a center position and other locations.
[Claim 13] In a processor which supplies and processes processing liquid to a rotating substrate,
A nozzle which carries out the regurgitation of said processing liquid,
A processor which is made to carry out relative displacement of said nozzle and substrate, and is characterized by providing a migration device which moves a supply location of processing liquid to a substrate so that it may become two or more locations of at least 2 locations of a center position and others almost of a substrate in case this nozzle supplies processing liquid.
[Claim 14] Supply of said processing liquid in said two or more locations of at least 2 locations of a center position and others almost is a processor according to claim 13 characterized by not being simultaneous.

[Claim 15] It is the processor according to claim 13 which above others go back and forth between 2 locations at least, and is characterized by supplying said processing liquid and a location of a base which supplies said processing liquid existing in a center position mostly in the middle of the path.
[Claim 16] In an art which supplies and processes processing liquid to a rotating substrate,
A process which rotates a substrate,
An art characterized by providing a process which supplies processing liquid while making it go among two or more locations of a substrate which pass through a center position mostly.

[Translation done.]